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Additives: Why Are They There?

Cooperative Extension South Dakota State University

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Food Safety

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Cooperative Extension Service
South Dakota State University
U.S. Department of Agriculture

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Today some of our food is mass produced. It's often shipped across country. It's packaged for a long shelf life. It needs additives. And the additives get publicity, some good, some bad.

There has been a lot said about the relationship between food additives and hyperactivity in children. At this time there is no scientific evidence that additives cause behavior problems in children.

Patricia Page
Extension nutrition specialist

Today we have a wider variety of foods available—and more additives in all foods—than ever before. Food additives are so much a part of the American way of eating in the 1980's that most of us would find it difficult to put together a meal that did not include them. The consumer depends upon and uses frozen foods, controlled atmosphere fruits, smoked-cured meats, prepackaged convenience foods and a wide assortment of high quality foods. Changing life styles have resulted in more additives than former generations could have imagined.

As Americans have moved from farms to cities there has developed a need for foods that can be mass produced, distributed over considerable distances and stored for long periods of time. We have a coast-to-coast food distribution system to feed our ever-expanding population. With only about 5 percent of the United States population growing food for the remaining 95 percent, much of the food would spoil before reaching the dinner table, if it weren't for additives. There are many more working women today than there were a generation ago and this has also created a demand for more pre-packaged convenience foods. Furthermore, greater sophistication has increased demand for year-round supplies of seasonal products. Additives, along with improved processing, packaging and distribution, have made seasonal food a year-round occurrence.

WHAT PURPOSES DO ADDITIVES SERVE?

An additive is intentionally used in foods for one or more of the following purposes:

1. To Maintain or Improve Nutritional Value

Foods are fortified with vitamins and minerals that might otherwise be lacking in a person's diet or that have been destroyed or lost in processing. Common nutritional additives include vitamin D in milk, vitamin A in margarine, vitamin C in fruit drinks and iodine in table salt. Breads and cereals are enriched with B vitamins lost or destroyed during milling and processing of grains. Such fortification has helped eradicate once prevalent deficiency diseases, such as rickets, scurvy, pellegra and goiter.

2. To Maintain Product Quality

Foods keep longer than they did years ago. Spoilage can be deterred by storage techniques—refrigeration, drying, freezing, souring, fermenting and curing. However, if only partial preservation can be achieved by processing, it is necessary to use additives which act as *preservatives* and *antioxidants* to extend the "good life" of the product. Foods last as long as they do on the shelf or in the refrigerator because of additives that retard spoilage, preserve natural color and flavor and keep fats and oils from turning rancid.

The oxygen in the air causes one of the most common types of food spoilage, an undesirable change in color or flavor. Antioxidants can prevent or delay this enzymatic browning. For example, ascorbic acid (Vitamin C) keeps uncooked peaches from turning brown. An even more important use today though, is the use of antioxidants in foods which contain fats and oils, since oxidation can cause the development of rancid tastes and odors. Processed foods which contain fat, such as cake mixes with shortening, are protected by antioxidants to maintain their best flavor during storage. Among the most important of these are butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT). Other antioxidants include propionates which aid in keeping baked goods from being spoiled by mold. When an antioxidant is not needed, it is not used.

3. To Aid In Processing and Preparation

A wide variety of compounds are used to give body and texture to foods, evenly distribute one liquid in another, affect cooking or baking results, control acidity or alkalinity, retain moisture and prevent caking or lumping.

- **Emulsifiers** give products such as peanut butter and mayonnaise a uniform texture and prevent them from separating into an oily layer at the top of the jar and a dry layer at the bottom.
- **Stabilizers** are used in certain foods to get uniform consistency or texture. Chocolate milk is one food that needs a stabilizer to keep the particles of chocolate from settling to the bottom of the glass or container.
- **Thickeners** such as starch create smoothness and body in sauces. Pectin and gelatin are thickeners used in jellies, preserves and desserts.
- **Humectants** are used to keep moisture in foods such as shredded coconut.
- **Leavening agents** such as yeast, baking soda and baking powder are essential to make baked goods rise.
- **Anticaking agents** are used in keeping salts and powders in such products as instant breakfast drinks, lemonade and other soft drink mixes free-flowing.
- **Foaming agents and foam inhibitors** are used to control the amount of air in products. Foaming agents, for example, help whipped topping "peak" when cold milk is beaten with it. Foam inhibitors give the consumer a full measure of processed drinks by removing the "head" from drinks such as orange and pineapple juice.
- **Maturing and bleaching** agents are used by many industries and are most important in flour milling and bread making. Freshly milled flour has a golden yellow color, the product of small quantities of natural pigments. It also lacks certain chemical qualities—what pastry chefs call "gluten characteristics" needed to make an elastic, stable dough. Such qualities can be acquired by aging and in the process the flour oxidizes and loses its golden glow. Thus, mature flour is white and possesses the qualities bakers want.

4. To Make Food More Appealing

The most widely used additives are those intended to make food look and taste better. These include *coloring* agents, natural and synthetic *flavors, flavor enhancers* such as MSG (monosodium glutamate) and *sweeteners.*

Flavor is an important influence in eating. If a food lacks good flavor, it will go uneaten, regardless of its nutritive value. Agents affecting flavor makes up the largest single category of food additives. The characteristic flavor of strawberry ice cream, for example, may come from real strawberries, or it may come from a chemical flavoring because we eat twice as many strawberry-flavored products as the nation's strawberry patches can produce.

Because consumers associate strawberries with a reddish color, strawberry ice cream is also tinted pink. It has been said "we taste with our eyes." In

fact, the appearance of a given food tends to reinforce its taste, and nothing is more important to appearance than color. Colors are added to soft drinks, candy and confectionery products, cordials, frozen desserts, gelatin desserts, some fruit products, prepared mixes and some dairy and bakery products.

DO ADDITIVES HELP IN PROVIDING OUR SAFE FOOD SUPPLY?

Food safety is improved by additives. The incidence of food poisoning and gastrointestinal illness has dropped dramatically over the last 30 years in part due to the use of additives in our food supply. Today the illnesses caused by the bacteria, molds and fungi which are the main causes of food-borne diseases, have been sharply reduced and when they do occur are more likely the result of careless food handling.

The food industry attempts to prevent or control the growth of microorganisms by adhering to good sanitary practices, by rigidly controlling critical points in processing where such microorganisms might be introduced and by using preservatives to retard the growth of microorganisms in food. One microorganism that is especially dangerous is Clos*tridium botulinum.* This microbe is potentially fatal and might be present in inadequately processed canned or otherwise preserved foods.

HOW IS THE SAFETY OF FOOD ADDITIVES ASSURED?

Few other products or services are tested for safety as thoroughly and completely as food additives. But, there is no way known to prove anything is completely safe, nor is there any such thing as absolute safety. To insure as much safety as possible manufacturers are required to test additives for the presence of hazards.

An approval process may take several years. Manufacturers must first subject a proposed new additive to a variety of chemical tests to be certain it fulfills the intended use and to make sure it can be analyzed and measured in the finished food product. Then the additive must be fed to a variety of laboratory animals in different concentrations over an extended period. These feeding studies are designed to determine whether the substance causes cancer, birth defects or other injury to the animals.

Manufacturers then submit the testing results to the Food and Drug Administration (FDA). If the FDA indicates the additive is safe, the Agency establishes regulations for how it can be used in food. A basic rule is a 100-fold margin of safety for anything added to food. This means that the manufacturer may use only 1/100th or less the maximum amount of an additive that has been found NOT to produce any undesirable or harmful effects in the most sensitive test animals. A special provision of the 1958 and 1960 Food Additive and Color Additive amendments, the Delaney Clause, states that a substance shown to cause cancer in man or animal may not be added to food in any amount.

WHAT ARE THE MOST COMMONLY USED ADDITIVES?

By far the most widely used additives are sugar, salt and corn syrup accounting for 93 percent by weight of all additives used in America. Other substances such as yeast, citric acid (a natural component of oranges and lemons), baking soda, vegetable colors (such as the red from beets), mustard, pepper and the carbon dioxide gas that gives soda its carbonation account for an additional 5.5 percent, by weight, of all food additives used in this country. The nearly 2000 other direct and indirect additives make up the remaining 1.5 percent balance.

HOW ARE FOOD ADDITIVES CONTROLLED?

Food additives are more strictly regulated now than at any other time in history. Despite our nostalgia for the good old days, eating was not specially safe at the turn of the century. It was difficult to protect foods from spoiling and manufacturers freely used pigments containing such toxic metals as lead, copper and arsenic to color candy, pickles and other foods.

The 1906 Food and Drugs Act and the more comprehensive Food, Drug and Cosmetic Act of 1938 gave the Government authority to remove unsafe or hazardous foods from the market. But it wasn't until the Food Additives Amendment was enacted in 1958 and the Color Additive Amendment in 1960 that the United States had laws specifically regulating food additives. In those amendments, the lawmakers shifted the burden from the Government to prove a food additive unsafe to the manufacturer to prove it safe. The amendments authorized the FDA to regulate additives only on the basis of safety. The FDA has no power to limit the number of additives approved or to judge whether a particular food color, thickener or sweetener is really needed.

HOW MUCH IS NEEDED?

The amount of a food additive necessary to perform a specific function is frequently infinitesimal. The permitted amounts of additives vary depending on the kind of food, the safety limits of the additive and the least amount needed to accomplish the desired result. One example can be seen in the prep-

aration of iodized salt. Less than 1/5 ounce of potassium iodide is added to each 100 pounds of table salt. Sometimes, however, a larger amount of an additive may be necessary to bring about the desired results. In the case of 100 pounds of baking powder, for instance, four pounds of calcium silicate might be used to keep the baking powder free-flowing. Whatever the amount, the exact proportion is scientifically controlled and only the amount necessary to produce the desired result is used.

WHAT WOULD HAPPEN WITHOUT FOOD ADDITIVES?

Highly respected scientists have pointed out that upheaval would result if food additives were removed from the American scene. Much of the food supply would literally come to a halt within a few weeks. A look at why food additives are used quickly reveals many foods that would not exist without the addition of additives. Other foods would lose flavor, color and keeping quality. Most foods would cost more and be less wholesome.

WHAT CAN YOU DO IF YOU ARE CONCERNED ABOUT FOOD ADDITIVES?

1. Make a Nutritious Diet Your Goal

Recognize nutritious foods. Serve them regularly.

2. Vary Your Diet

Throughout the year good fresh, frozen, canned or dehydrated foods are generally available. With the wide variety of foods available, menus can be more interesting and there is less chance of consuming excessive amounts of any one foodstuff or additive. Careful planning, selection and preparation of food contribute to better nutrition and add to your eating pleasure.

3. Become Informed

Start by reading labels to find out what is in the foods you buy. The names of additives must be included in the list of ingredients, although the law permits colors and flavors to be described in general terms like "artificially flavored" and "artificially colored." Learn what the various additives do and decide which ones are of most concern to you. Seek out dependable sources of information to guide your selection and preparation of foods.

4. Exercise Your Right To Be Selective

Once you are informed, you can select foods on the basis of characteristics that mean the most to you—convenience, appeal, storage time. You might want to continue buying bread with sodium propionate if you know it prevents molds, but you may not want to buy cookies that are artificially colored. It's your choice.

5. Make Your Views Known

Let manufacturers know what you want and don't want in your food. Express your views to your representatives in Congress. Food additives, like most things in life, involve a trade-off. Scientists will never be able to guarantee that anything added to food is absolutely safe. Ultimately, it is up to you, the consumer, to decide what degree of risk is an acceptable price to pay for foods that keep well and are appealing, nutritious, convenient and readily available year-round.

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